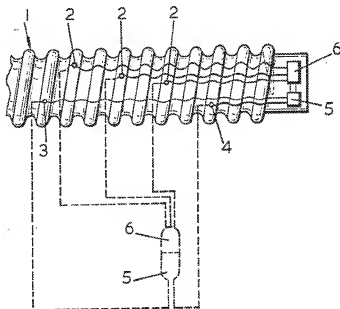




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification<sup>3</sup> :</b> A61F 1/00; A61B 10/00, 5/07	<b>A1</b>	<b>(11) International Publication Number:</b> WO 83/03348 <b>(43) International Publication Date:</b> 13 October 1983 (13.10.83)
<b>(21) International Application Number:</b> PCT/GB83/00089 <b>(22) International Filing Date:</b> 24 March 1983 (24.03.83) <b>(31) Priority Application Number:</b> 8208865 <b>(32) Priority Date:</b> 25 March 1982 (25.03.82) <b>(33) Priority Country:</b> GB <b>(71) Applicant (for all designated States except US):</b> J. & P. COATS, LIMITED [GB/GB]; 155 St. Vincent Street, Glasgow (GB). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> HOOD, Robert, Gordon [GB/GB]; 'Koinonia', 30 Park Avenue, Paisley, Renfrewshire (GB). <b>(74) Agent:</b> COATS PATONS PLC; Patent Department, P.O. Box, 155 St. Vincent Street, Glasgow, G2 5PA (GB).		<b>(81) Designated States:</b> AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent), US. <b>Published</b> <i>With international search report.</i>

**(54) Title:** VASCULAR PROSTHESIS**(57) Abstract**

A vascular prosthesis for replacing a portion of a blood vessel in a human or animal body incorporates a tube (1) of textile material incorporating at least one transducer (2, or 3, 4) attached to the tube wall and a transmitting device (6) for transmitting a radio signal connected to the transducer whereby to transmit information about conditions sensed by the transducer.

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VASCULAR PROSTHESIS

The subject of this invention is a vascular prosthesis assembly and particularly a prosthesis assembly incorporating a tubular graft to be used for replacing a portion of a blood vessel in a human or  
5 animal body.

The use of vascular prostheses is becoming more and more widespread in the treatment of certain biological conditions but at present such prostheses are merely substitutes for blood vessels. In other  
10 words once a prosthesis has been inserted as a graft in a blood vessel there is no way of knowing what is actually happening in the blood vessel without actually making a surgical examination.

It would be of great advantage if a patient  
15 fitted with a vascular prosthesis could be monitored afterwards without the necessity for later surgical examination or a cybernetic reaction could be initiated on other associated organs automatically in accordance with conditions prevailing in the patient's blood. It  
20 is an object of the present invention to provide a prosthesis which makes these desirable objectives possible.

A vascular prosthesis assembly according to the invention incorporates a tube of textile material  
25 incorporating at least one transducer sensitive to at least one of the conditions to be monitored attached to the tube wall so that the sensitive portion of the transducer is exposed to the interior of the tube and a transmitting device to which the transducer is  
30 connected arranged to transmit a radio signal which carries information about conditions prevailing in blood passing through the prosthesis.

The prosthesis may incorporate several



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transducers each sensitive to a different characteristic. For example there may be incorporated a transducer sensitive to blood pressure, there may be incorporated a transducer sensitive to the pH value of the blood, there may be incorporated a transducer sensitive to temperature. There may be incorporated in the prosthesis two transducers spaced axially from one another, one transducer being a sound-emitting transducer and the other transducer being a sound-receiving transducer and computing means capable of determining the rate of flow of blood through the prosthesis, for example by use of the doppler effect.

The transducers may be incorporated in the structure of the prosthesis or may be attached to the prosthesis by bio-compatible adhesive.

The signals produced by the transducers may be such that they can be picked up by a receiver located outside the body at a distance from the body or it may be arranged that they are picked up by a receiver located at another organ in the body, that receiver being arranged to stimulate that organ to operate in accordance with the signal received whereby to compensate for some undesirable effect or trend perceived by the transducer in the prosthesis.

A practical embodiment of the invention is illustrated in the accompanying drawing in which 1 denotes a tube of textile material constituting a prosthesis, 2 denotes transducers sensitive to characteristics to be monitored and 3 and 4 are two transducers one of which is capable of issuing a sonic signal and the other is capable of receiving a sonic signal. 5 denotes computing means in the form of a micro-computer arranged to control operation of the transducers 3 and 4. 6 denotes a radio transmitter arranged to transmit as radio signals the signals from the transducers and from the micro-computer. In the illustrated embodiment the transmitter



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and the micro-computer are incorporated in a separate capsule which may be located at a remote point, for example the capsule may be located for convenience of access in a subcutaneous position. However, the transmitter and the micro-computer may be located in separate capsules or in the same capsule which may be located on the graft or at another convenient site.

As a result of modern technology there are at present available transducers, radio transmitters and micro-computers small enough to be incorporated in a vascular prosthesis without deleterious effect on the operation of the prosthesis.



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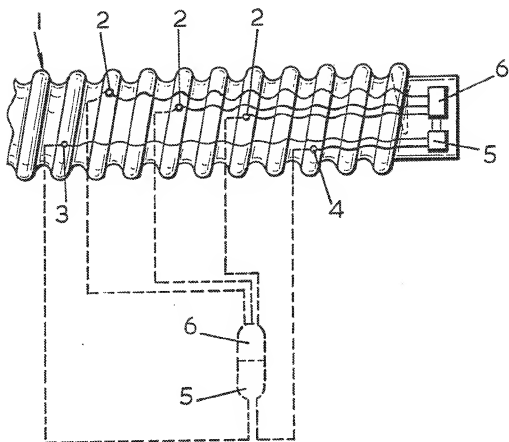
CLAIMS

1. A vascular prosthesis assembly comprising a tube (1) of textile material is characterized in that the tube incorporates at least one transducer (2 or 3, 4) sensitive to at least one of the conditions  
5 to be monitored attached to the tube wall so that the sensitive portion of the transducer is exposed to the interior of the tube and a radio transmitting device (6) to which the transducer is connected to transmit a radio signal which carries information about  
10 conditions prevailing in blood passing through the prosthesis.

2. A vascular prosthesis assembly according to claim 1 characterized in that the prosthesis incorporates two transducers (3, 4) spaced axially from  
15 one another, one transducer (3 or 4) being a sound-emitting transducer and the other transducer (4 or 3) being a sound-receiving transducer and computing means (5) capable of determining the rate of flow of blood through the prosthesis, for example by use of the  
20 doppler effect.



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SUBSTITUTE SHEET



# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 83/00089

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) * According to International Patent Classification (IPC) or to both National Classification and IPC IPC <sup>3</sup> :        A 61 F 1/00; A 61 B 10/00; A 61 B 5/07														
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched *</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; border-bottom: 1px solid black; vertical-align: top;">Classification System</td> <td style="border-bottom: 1px solid black; vertical-align: top;">Classification Symbols</td> </tr> <tr> <td style="border-bottom: 1px solid black; vertical-align: top;">IPC<sup>3</sup></td> <td style="border-bottom: 1px solid black; vertical-align: top;">A 61 F; A 61 B</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *</div>			Classification System	Classification Symbols	IPC <sup>3</sup>	A 61 F; A 61 B								
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<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category *</th> <th style="width: 70%; border-bottom: 1px solid black;">Citation of Document, <sup>15</sup> with Indication, where appropriate, of the relevant passages <sup>17</sup></th> <th style="width: 20%; border-bottom: 1px solid black;">Relevant to Claim No. <sup>18</sup></th> </tr> <tr> <td style="vertical-align: top; padding: 5px;">A</td> <td style="vertical-align: top; padding: 5px;">US, A, 3986828 (HOFFMAN) 19 October 1976 see abstract and figures ---</td> <td style="vertical-align: top; text-align: center; padding: 5px;">1</td> </tr> <tr> <td style="vertical-align: top; padding: 5px;">A</td> <td style="vertical-align: top; padding: 5px;">US, A, 4190057 (HILL) 26 February 1980 ---</td> <td></td> </tr> <tr> <td style="vertical-align: top; padding: 5px;">A</td> <td style="vertical-align: top; padding: 5px;">FR, A, 2352286 (CATHIGNOL) 16 December 1977 see page 2, line 31 - page 3, line 21 and figure 1 -----</td> <td style="vertical-align: top; text-align: center; padding: 5px;">1,2</td> </tr> </table>			Category *	Citation of Document, <sup>15</sup> with Indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>	A	US, A, 3986828 (HOFFMAN) 19 October 1976 see abstract and figures ---	1	A	US, A, 4190057 (HILL) 26 February 1980 ---		A	FR, A, 2352286 (CATHIGNOL) 16 December 1977 see page 2, line 31 - page 3, line 21 and figure 1 -----	1,2
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: <sup>16</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 50%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>														
<b>IV. CERTIFICATION</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; vertical-align: top;">Date of the Actual Completion of the International Search *</td> <td style="width: 50%; border-bottom: 1px solid black; vertical-align: top;">Date of Mailing of this International Search Report *</td> </tr> <tr> <td style="border-bottom: 1px solid black; vertical-align: top; text-align: center;">27th June 1983</td> <td style="border-bottom: 1px solid black; vertical-align: top; text-align: center;">08 JUL 1983</td> </tr> <tr> <td style="border-bottom: 1px solid black; vertical-align: top;">International Searching Authority *</td> <td style="border-bottom: 1px solid black; vertical-align: top;">Signature of Authorized Officer <sup>19</sup></td> </tr> <tr> <td style="border-bottom: 1px solid black; vertical-align: top; text-align: center;">EUROPEAN PATENT OFFICE</td> <td style="border-bottom: 1px solid black; vertical-align: top; text-align: right;">G.L.M. Kruyenborg</td> </tr> </table>			Date of the Actual Completion of the International Search *	Date of Mailing of this International Search Report *	27th June 1983	08 JUL 1983	International Searching Authority *	Signature of Authorized Officer <sup>19</sup>	EUROPEAN PATENT OFFICE	G.L.M. Kruyenborg				
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EUROPEAN PATENT OFFICE	G.L.M. Kruyenborg													



## ANNEX TO THE INTERNATIONAL SEARCH REPORT OM

INTERNATIONAL APPLICATION NO.

PCT/GB 83/00089 (SA 4933)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 05/07/83

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3986828	19/10/76	None	
US-A- 4190057	26/02/80	None	
FR-A- 2352286	16/12/77	None	

For more details about this annex :

see Official Journal of the European Patent Office, No. 12/82

